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Pathway through Math:
Educator Perspectives on Middle School Math Acceleration

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Pathway through Math:
Educator Perspectives on Middle School Math Acceleration

by

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Abstract

Pathway through Math:
Educator Perspectives on Middle School Math Acceleration

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This thesis reports a study of middle-school mathematics teachers' attitudes about teaching Geometry in middle school, along with the difference between the factors they think should be used in placing students in the advanced (Geometry) track and what factors are actually considered. Mathematics is a subject which sees significant racialized tracking due to the sequential nature of its course progression coupled with inequitable data measurements and placement methods. While the Common Core State Standards (CCSS) present a standard course progression that does not include Algebra 1 at the middle school level, many school districts continue to include it, and in some cases, Geometry, as options for higher-performing students. In this study, three middle school teachers from two school districts that offered different middle school mathematics course progressions were surveyed, and the responses were then analyzed and coded. Though these teachers had idealized notions of placement tests being the best measure for a student's mathematical readiness, additional considerations such as equity concerns and parental disagreement contributed to the actual placement of students into advanced course pathways. This thesis discusses implications for equity in middle school math.

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Introduction

Middle school mathematics course-taking has been a topic of research for some time. Specifically, early-algebra course-taking, which typically occurs in a student's eighth grade year, can allow access to advanced mathematics courses later on in a student's academic career. Research about what student groups are more likely to be placed into these courses has illuminated significant disparities; white, high-socioeconomic status students are far more likely to take advanced courses in middle school than their Black and low-socioeconomic status peers. The consequence is that the students who are already advantaged within the United States education system are then afforded opportunities for advanced course-taking that their less advantaged peers are not.

Within this context, schools and teachers must navigate the student placement process. Further studies have highlighted the different measures that are considered when placing students into advanced math pathways on the large scale, such as achievement measures and teacher recommendation. Additionally, there has been much research on the long-term consequences for students who are and are not given the opportunity to access advanced math courses in middle school. Qualitative studies have contributed to the understanding of how families and schools approach course-taking, and provided a richer context in which to view the inequities revealed though quantitative studies.

This thesis will contribute to the existing research in this domain by analyzing qualitative interview data from three educators who teach in two different public school districts within the same state. The differences in course progression structure for these two districts allows for a comparison between educator approaches to student readiness and placement. Specifically, the option for eighth grade Geometry in one district but not the other revealed differences in opinions about whether students should be accelerated from an early age. Additionally, the differences in high school course design between the two districts illuminated further differences in the educators' approach to middle school acceleration.

Literature Review

Mathematics Course Progression in the US

To understand the significance of a student taking Algebra I or Geometry in eighth grade, it is important to examine the existing course progression and its origins. The vast majority of high school students in the United States experience math as a sequence of yearlong courses in the order of Algebra I, Geometry, and then a second year of algebra (Algebra II) (National Council of Teachers of Mathematics [NCTM], 2018). Curriculum reform movements have seen shifts in priorities of instructional practice (Cuban, 1990; Cheek & Castle, 1981; Stanic & Kilpatrick, 1992), but the sequential nature of math courses remains largely untouched.

With the release of the Common Core State Standards (CCSS) in 2010, many school districts around the country adjusted their curriculum to include the new changes to content. A study by Porter et al. (2011) examined the differences in the level of rigor between existing standards and the new CCSS; they concluded that "the Common Core standards represent considerable change from what states currently call for in their standards and in what they assess" (p. 114). Another analysis by Cobb and Jackson (2011) found the overall coherence and quality of the CCSS to be an improvement on existing curricula in the US, though more recent research has taken a more nuanced approach due to the dichotomous response that has emerged in the public forum (Clements et al., 2019; Tampio, 2018).

One observation that persists is that the new standards contain more content than prior curricula. This is in line with recommendations from various reports over the years (National Commission on Excellence in Education, 1983; NCTM, 1980, 2006; National

Research Council, 1989). This has caused school districts, including "District A" which employs two of the participants interviewed for this thesis, to adjust their middle school course progression to assure in-depth content coverage. Figure 1 shows an example of some of the content changes that occurred in terms of the placement of certain mathematical topics within CCSS Math 8 and CCSS Algebra I as compared to the previous standards for Algebra I in California.

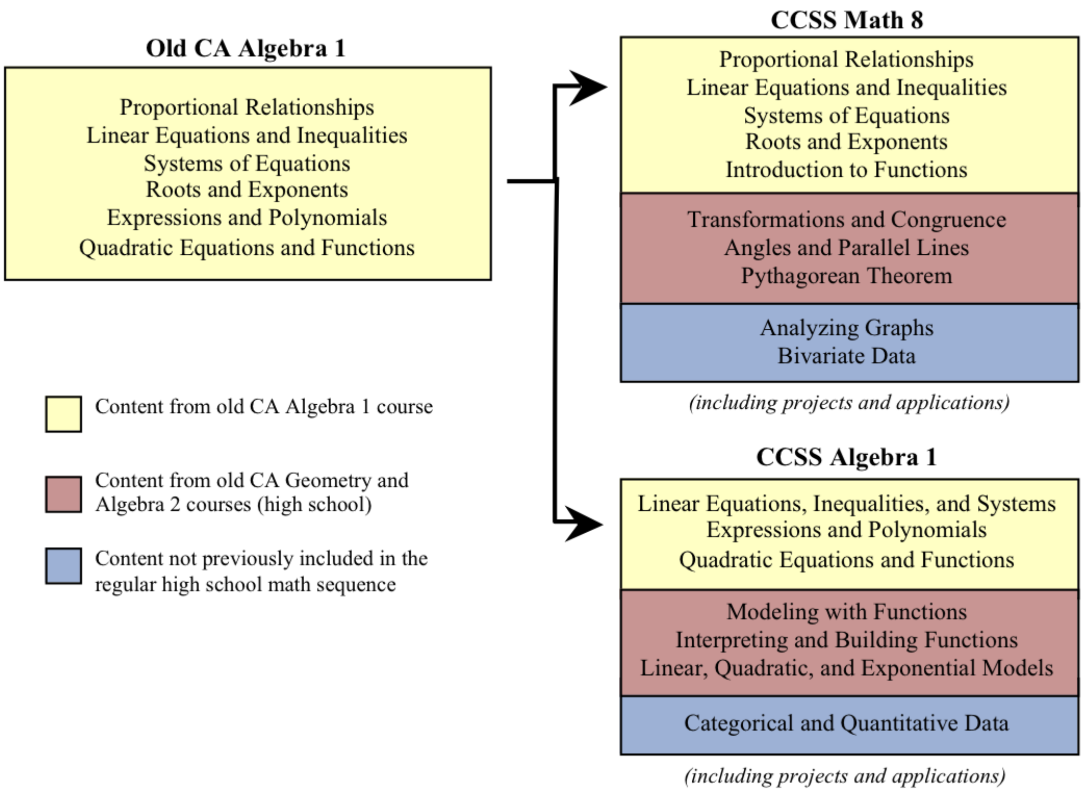

Figure 1. San Francisco Unified School District Mathematics Department Website, 2021

An example of a school system which drastically changed its approach to acceleration is the San Francisco Unified School District (SFUSD), which mandated all students take Algebra I in ninth grade, and focused its middle school curriculum around task-based learning that adjusted to all learning levels. This change was largely driven by recommendations from the National Council of Teachers of Mathematics (NCTM) (2018), and internal research and examination of equity and tracking in the district (Torres et al., 2019). Occasionally, independent schools (and some school systems) implement a more integrated math approach that doesn't follow the traditional course progression, though this trend existed prior to the shift to Common Core (St. John et al., 2004).

Examples such as these highlight the widely accepted notion that the math education system in the U.S. does not fit the needs of all students. However, changing the nature of the progression itself does not fit in the purview of this thesis. Instead, the focus will not be on *which* courses students take, but rather *when* in a student's academic career the courses are taken. Since the mathematics course progression for high school typically starts with Algebra I, this course is seen as a "gatekeeper" for accessing higher-level mathematics. Accessing Algebra I, or even higher-level courses such as Geometry, in middle-school[1] then opens these doors earlier.

Racial Segregation in Advanced Middle School Mathematics Courses

Given the linear course progression of US math curricula, it stands to reason that the earlier a student enters the high school progression (starting with Algebra I), the higher chance they have of completing advanced courses such as Calculus. Some course progressions are designed with the end goal of Calculus for all students as the guiding factor (St. John et al., 2004). Regardless, beyond the overall benefits of seeking a quantitively literate society (Cogan et al., 2001), advanced courses open doors for students

[1] Defined in this thesis as grades 6 though 8

when it comes to college applications and potential success on standardized tests (Wang & Goldschmidt, 2003; Spielhagen, 2006).

The benefits and consequences of early placement will be discussed in the next section of this literature review, but first it is necessary to discuss the disparities between different groups of students who are placed into these courses, along with the factors that enable this inequity to occur. This phenomenon is contextualized within the documented racial segregation that is present in the U.S. school system. Reardon and Owens (2014) argue that racial desegregation in the U.S. has remained relatively unchanged in the last few decades, and the research in this area has two major focuses: across-school and within-school segregation.

Decades of sociological and educational research has revealed that race is frequently a major predictor of course placement (Domina, 2014; Mickelson, 2015; Riegle-Crumb 2006; Morton & Riegle-Crumb, 2019; Cogan et al., 2001). For example, in an analysis of the 1995 Third International Mathematics and Science Study (TIMMS) data, Cogan, Schmidt & Wiley (2001) found that "across all U.S. schools, opportunities for the more challenging types of mathematics—pre-algebra, enriched, and algebra—were all significantly related to both the percentage of minority[2] enrollment and grade enrollment size" (p. 330). They go on to specify not only that schools with higher percentages of

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[2] The term "minority" is used in several of the studies referenced in this section, though use of this term has been deemed problematic in modern educational research due to how it is often used in a deficit-based way. When referring to minoritized groups of students, specifically Black and Hispanic students, I use the term "historically marginalized".

historically marginalized students were less likely to offer higher-level mathematics courses, but the lack of consistency in eighth grade math expectations across all U.S. schools was “chaotic” and counter to the commonly accepted goal of providing equal opportunities for all students.

Additionally, Domina’s (2014) analysis of the Early Childhood Longitudinal Study’s Kindergarten Cohort (ECLS-K) found that student placement in middle school mathematics courses was clearly delineated by factors such as race, gender and family background. For race specifically, he concluded that Black students were greatly overrepresented in general mathematics, while white and Asian students were overrepresented in higher-level math courses such as Algebra I and Geometry. It was also noted, however, that the inequalities that were illuminated in the results are largely explained by inequalities in student achievement that predate middle school mathematics course placement.

Other studies which show that mathematics course placement is predicted by race include Mickelson’s (2015) analysis of longitudinal data gathered in the Charlotte-Mecklenburg Schools, and Morton and Riegle-Crumb’s (2019) analysis of data gathered from a large, diverse urban school district in the southwest United States. While Mickelson’s data was gathered from a majority-white district (at the time), Morton and Riegle-Crumb’s data is indicative of the increasing representation of historically marginalized groups. Both studies had similar conclusions about which student groups are more likely to be placed into higher-level mathematics courses: Mickelson concluded that the more time students spend in segregated schools, and the higher percentage of Black students in a middle school, the lower the chance of those students being placed into college-preparatory tracks, and Morton and Riegle-Crumb found that even in integrated schools (where white students are still largely overrepresented in Algebra I), and majority-Hispanic schools, Black students specifically are largely underrepresented in eighth grade Algebra I.

Tracking in Middle School Mathematics

A driving force for the documented inequality in higher-level mathematics courses is a phenomenon called "tracking". Cogan, Schmidt and Wiley (2001) define tracking as "within-school curriculum differentiation that varies the curriculum from *course-to-course*" (p. 324). Mickelson (2015) refers to racially-correlated academic tracks as second-generation tracking. Reardon and Owens (2014) measure in-school segregation using two measures: "unevenness", which refers to how student populations are represented *across* schools and "exposure or isolation", which measures the makeup of the student population *within* a school. A school district with a predominantly white population of students could have evenness across its schools, but the schools themselves might have high isolation (low exposure) for the white students due to the low number of non-white classmates. For the purposes of this thesis, tracking is the main mechanism by which students are placed (or, more importantly, not placed) into higher-level mathematics course pathways.

In addition to the within-school element of racialized tracking, opportunity to learn (OTL) is a term which is used to study the differences in content from across schools (Cogan et al., 2001; Morton & Riegle-Crumb, 2020). Morton and Riegle-Crumb (2020) studied the issue of OTL by specifically examining the content coverage reported by teachers. They found that Algebra I courses at middle schools with higher proportions of Black students cover less algebra content than courses at predominantly white schools. Thus, not only are students less likely to be enrolled in eighth grade Algebra I based on race, but schools with higher isolation of Black and Hispanic students, among other factors, do not have the same learning opportunities once they get to those courses.

A recent study conducted by Irizarry (2021) addressed tracking in the transition from middle school to high school. This transition can come with many logistical elements, and involves choices on the part of the student and their family along with recommendations from counselors. Irizarry found through her analysis of a nationally-representative data set that despite similar performance on assessments and grades as their white peers, Black and Black Latinx students who start on an accelerated course trajectory in middle school are more likely than their white peers to “jump tracks” and re-take courses in ninth grade.

Placement Measurements

The mechanisms through which students are placed into course pathways are usually a combination of quantitative (such as prior achievement) and qualitative (such as teacher recommendation) measures. Both of these have the potential to be influenced by racial bias, as was illuminated by the work of Spielhagen (2006), Faulkner et al. (2014) and Domina (2014), among others. Beyond simply recognizing *that* the demographics among math courses are imbalanced, it is important to realize the roots of why they are imbalanced to begin with, thus shifting the lens away from simply an achievement-gap focus (Gutiérrez, 2008).

Placement is frequently determined by prior achievement indicators, such as grades and standardized test scores. Mickelson (2015) examined survey data she collected from a southern school district as well as data from a large-scale data set to provide context for racial makeup within the student body. Findings confirmed that students in elementary schools with higher percentages of Black students demonstrated lower achievement that compounded throughout their time in middle school, making them significantly less likely to be placed on the college-preparation track. Wang and Goldschmidt (2003) arrived at similar conclusions about the regulating power of elementary school OTL when it came to likelihood of being placed onto advanced mathematics tracks.

Teacher recommendation is also a significant factor that is considered in track placement. The work of Faulkner et al. (2014) examined the role that teacher recommendation has for students; particularly, how significant a consideration it was in Black versus white students. They found that for Black students, teacher recommendation was equally as likely in predicting algebra placement as math performance, while for white students, math performance was a starkly higher predictor. Other research which examines racial bias in teachers, such as the work of Musto (2019), indicates that teachers demonstrate and communicate gendered and racial bias in school environments. Since teacher recommendation is one of the contributing factors for student placement in higher-level math courses in middle school, racial bias on the part of teachers can contribute to the underrepresentation of historically marginalized students in these courses.

Parent Involvement

An element of the large network of factors that motivate segregation in course-taking which has not yet been addressed is the impact of parental involvement. Students can be impacted by parental involvement both positively and negatively, through encouragement and resources. This does not necessarily pertain to math specifically, as it is a topic within the sociology of education which has been studied at many different levels (e.g. Lewis & Diamond, 2015; Crosnoe & Huston, 2007; Noguera & Wing, 2006; Calarco, 2020; and Filer & Chang, 2008).

The most obvious way that parental involvement impacts student success is through the use of resources, in the form of both physical and social capital. For example, Calarco (2020) studied how dependence on the resources that higher-SES white families are able to bring to schools influences how teachers enforce rules. She found that teachers had a fear of enforcing homework policies for students whose parents were active in the parent-teacher organization, or who gave money or resources for school events. Additionally, students whose parents did not frequently communicate with teachers were less likely to receive leniency on rule enforcement; this indicates that home-school communication is an important social capital that some parents are not aware of.

Parental involvement in schools is often linked to socioeconomic status (SES). Crosnoe and Huston (2007) examined how parental consultation and SES affect mathematics course-taking, and concluded that while parental consultation played similar roles for both high-and-low SES families, the start and end points were very different from one another. This contributed to the existing theory regarding the varying difficulties in how families navigate the education system. In addition to arriving at similar conclusions regarding SES, Filer and Chang (2008) used quantitative analysis to determine the effect of parent encouragement on math specifically. They found that parent encouragement was a strong predictor of student attendance in Algebra I. This was additionally correlated with peer encouragement, indicating that students whose parents encouraged enrollment in algebra were more likely to have peers who express positive mentalities towards early Algebra I placement.

The extent to which certain parents understand how to navigate the education system more than others is illuminated in the qualitative work of Lewis and Diamond (2015) and Noguera and Wing (2006). In both of these studies, the authors conducted ethnographic research to understand the issue of tracking from multiple perspectives (students, educators, and parents), and a theme that emerged in both was the idea of parents understanding how to “play the game”. That is to say, they had the cultural capital to know which teachers were the best, which courses their student should take, and how to go against counselor recommendation.

An example of this from Lewis and Diamond (2015) is that many of the white parents interviewed about enrolling their students in higher-level math courses indicated that their child was initially placed into the on-grade pathway, but instead decided to enroll them in honors courses. This same confidence with going against the school’s recommendation was not found in the majority of Black parents, except for a select few who described a level of push-back from counselors that the white parents did not encounter. Noguera and Wing (2006) described a computerized system in which students could prioritize courses where they wanted specific teachers, a system which the school implemented to combat the previous advantage that privileged students and parents who were “in-the-know” had in course selection. However, even this system was ultimately taken advantage of by the same students who were benefitting previously. Both of these examples show that there is a certain amount of cultural capital that white, high-SES families have access to, which others do not.

Outcomes for Students Who are Denied Access to Early Advanced Course Placement

It has been made evident that tracking based on certain demographic markers (specifically race and SES) is present in the US. The other side of this issue is analyzing why exactly it matters that certain students access higher-level math courses at earlier points in their academic careers. In short, students who are able to access advanced course-taking in middle school take more high-level mathematics courses in high school (Spielhagen, 2006; Ma & Wilkins, 2007; Riegle-Crumb, 2006) and have higher math achievement (Wang & Goldschmidt, 2003; Ma & Wilkins, 2007).

As was previously mentioned, researchers of math education have been encouraged to stray from “gap-gazing” (Gutiérrez, 2008), though several of the articles referenced in this section focus on identifying achievement gaps due to tracking. These pieces of research play a role in the broader picture of equity-minded research, and provided a foundation upon which to study the intricacies of how tracking begins and how it presents itself in our education system. For that reason, this section plays an important role in understanding this issue, despite the between-group, disparity-based focus of their results.

High School Course-Taking

The first and most obvious way that tracking affects students is that students who do not take Algebra I until ninth grade are usually limited in the level of mathematics they are able to reach. There is much research which shows that students who do not access early Algebra I also do not access the same number of higher-mathematics courses as their peers who take Algebra I in eighth grade (Spielhagen, 2006, Rickles, 2013, Ma & Wilkins, 2007, Wang & Goldschmidt, 2003, Riegle-Crumb, 2006). In addition to being counter to the goal of a “quantitatively literate society and, ultimately, a technologically prepared work force” (Cogan et al., 2001, p. 337), not accessing higher levels of mathematics jeopardizes students’ chances of getting into college (Speilhagen, 2006).

Additionally, students who are less likely to be placed into advanced pathways to begin with are also more likely to be placed in remedial courses once they get to high school (Wang & Goldschmidt, 2003). Given that remedial courses frequently involve additional designated math time in students’ schedules (Stein et al. 2011), this puts students at a double disadvantage for their comprehensive high school curricula. Combine these results with Irizarry’s (2021) finding that certain groups of historically marginalized students (specifically, Black and Black Latinx students) are more likely to re-take Algebra I courses once they get to high school, and it’s clear that certain students are more limited in their course-taking opportunities in high school as a result of tracking.

Achievement Measures

Early advanced course-taking also has an effect on achievement measures such as end-of-course exams (Spielhagen, 2006), and standardized assessment data (Ma & Wilkins, 2007, Filer & Chang, 2008). While these data measures are increasingly approached with scrutiny over whether they equitably determine student understanding (Lubienski & Gutiérrez, 2008), given the potential they have for affecting a student’s college-going likelihood (Spielhagen, 2006), a focus on the achievement gap between students who have and have not accessed Algebra I at an earlier academic stage bears consideration.

In a study which examined the regulating power of eighth-grade Algebra I on long-term achievement, Ma and Wilkins (2007) found that the earlier a student takes courses like Pre-Algebra, Algebra I, or Geometry (and, in a few cases, Algebra II), the higher the long-term achievement scores. Additionally, in many cases the largest gains were made between the eighth and ninth grade assessments, indicating that eighth grade in particular is a significant year for a student's mathematics career. The study also revealed that the advanced coursework itself has regulating power over achievement; that is to say, there is content in advanced courses that contributes to a student's body of knowledge that they would not obtain through natural maturation alone. Strikingly, this phenomenon was found not to differ significantly for different SES, racial and gender groups, indicating that all students benefit equally from taking advanced courses earlier.

In terms of later-high school effects, Wang and Goldschmidt (2003) revealed through their longitudinal study examining the high school mathematics achievement based on middle school math placement that the inequitable distribution of students in eighth grade algebra became increasingly inequitable by 11th grade. Specifically, Hispanic and Black students were drastically underrepresented in advanced mathematics courses. This shows that students who do not have the opportunity to enroll in Algebra I at earlier points in their academic career do not have the same OTL in high school as their peers.

Mixed Results from De-Tracking

Due to the clear issues of inequity in how historically marginalized students are a) less likely to be placed in Algebra I courses in middle school and b) suffer compounded consequences for not taking these courses early, the research focus for some scholars has been examining systems which implement universal Algebra I policies and whether they are effective in achieving greater equality for all students (Stein et al, 2011; LaMar et al., 2020; Rickles, 2013). This is partially in-line with arguments made by Gutiérrez (2008; Lubienski & Gutiérrez, 2008), in which she proposes that researchers should shift away from studying the achievement gap and instead focus on examining mathematical identities of, and policies which intend to support, historically marginalized students.

A review conducted by Stein et al. (2011) focused on the difference between selective versus universal Algebra I placement. Based on evidence from 44 studies, the authors concluded that eighth grade Algebra I placement alone does not guarantee the positive outcomes that have been found in some selective studies. Additionally, even within the successful universal programs, placement based on ability grouping was still often present, and frequently students who were under-prepared were given additional time for Algebra I in their schedules. Assuming that mathematics is not the only important factor in a student's education (as we should), this finding has implications for OTL in other courses, academic and not.

Research about a district that implemented de-tracking in middle school and required all ninth grade students to take Algebra I has yielded some mixed results (LaMar et al., 2020). On one hand, some of the more traditional metrics indicate that this policy is a success: higher percentages of students accessing higher-level courses, higher graduation rates, and significantly lower Algebra I failure rates. However, closer examination of instruction revealed that students began to develop more binary perceptions of each other, labeling each other as smart or stupid. Research about identity might point to this as an ultimately harmful dynamic to students in the long-run (Nasir & Hand, 2006).

Missing from the Literature

As indicated by the studies and articles addressed so far, most of the research on middle school math progression examines the significance of taking Algebra I in eighth grade, considering it to be the "accelerated" pathway for students. While this is still the case in many school systems, there are also districts around the country which offer an even more advanced option: eighth grade Geometry. Given the clear inequities that present themselves in the placement of students onto the advanced tracks, and the compounding effects on high school achievement and course-taking, it stands to reason that Geometry would only accentuate these already observed phenomena.

There is little-to-no existing work that addresses eighth grade Geometry. In the articles that were reviewed for this thesis, student enrollment in Geometry might be measured, but rarely was it explicitly analyzed beyond just acknowledging the demographic differences (e.g. Domina, 2014). If Algebra I is a gate-keeper course which already enhances inequity within mathematics education, the presence of even more advanced courses is likely to influence the gap even more. Policy makers, educators, and administrators should be made aware of how middle school Geometry course-taking affects the students who do and do not access such an advanced level of mathematics in middle school.

Theoretical Framework

The selection of readings in the preceding literature review was motivated by sociocultural theory. According to Russ, Sherin and Sherin (2016), “sociocultural theorists tend to study broader activity systems by placing individuals within the larger cultural and historical context” (p.403). I believe this is the best lens through which to analyze the issue of tracking because there are many factors that influence the placement of students. Racial bias, cultural capital, and opportunity to learn are all sociological concepts which framed my literature review and influenced the questions I developed for my interviews.

The design of my study, along with the discussion of my results, is framed by the themes that emerged in my literature review. Clearly, there are larger socioeconomic forces that influence which students take algebra and when. Considering the prominent inequity within this topic is essential when designing a study which seeks to gain further understanding of tracking. Therefore, the questions that I asked did not shy away from the motivating factors of course acceleration, but sought to understand how these forces influence the opinions and actions of the educators who participated in the study.

Research Questions

As the purpose of this research is to shed light on teacher viewpoints about whether and how students should be accelerated, the research questions that will be explored in this thesis were designed to address the various aspects brought up in the literature review: placement, tracking, and consequences.

The research questions that will be addressed in the results of this study are:

Research Question 1: Do educators believe that offering Geometry courses in middle school is a good idea?

The transition to Common Core added several content standards to the Math 8, Algebra I and Geometry courses. This question seeks to answer how some educators feel about offering Geometry in this new, more difficult context.

Research Question 2a: What do educators identify as the most important factors that should be used for placing students into advanced math courses in middle school?

This question seeks to compare what the literature says about the tracking process to the ideal criteria that some educators think should be used for placement.

Research Question 2b: What do educators identify as the factors that actually motivate student placement?

As opposed to the last question, which addresses an idealized process, this question seeks to illuminate how educators believe placement decisions are actually made, especially in light of some of the factors addressed in the literature.

Methods

Many of the studies referenced in the literature review of this report used quantitative analysis to examine student populations in higher-level mathematics courses, the achievement measures which lead to tracking, and the long-term effects of taking (or not taking) higher-level math courses early in an academic career. Qualitative research which focuses on inequities in course placement does not typically have a specific focus on mathematics, but regardless of content it contributes to the understanding of how these inequities come to be and how they affect the education community. The purpose of employing qualitative methods for this study is to contribute a richer perspective to the existing body of literature, specifically the educator perspective on student placement and acceleration.

Approval from the IRB of the University of Texas at Austin was received prior to conducting this research.[3] As this research was conducted for the purpose of compiling a thesis, it was necessarily limited in scope. I interviewed three educators from two different public school systems in the Mid-Atlantic region of the United States about their experiences with, and opinions of, middle school course acceleration. All three participants are currently teaching, and fill various roles in their respective school systems. Both school districts have limitations on the types of research that can be conducted within their schools, including specifically that employees could not participate in master's thesis research where the employee or district were identifiable. All identifying factors for the districts and the participating educators (including their names) have been removed.

[3] IRB ID: STUDY00000869

Cathy spent most of her career as a middle school math specialist and teacher, Harper is a current middle school math specialist who also teaches math support classes, and Simon is an Algebra I and Geometry teacher at his middle school, along with acting as the math department head for several years. The participants were chosen intentionally through my previous connections to them as colleagues. I have professional experience with each of the three which caused me to seek them out as sources for this research. Based on my conversations with them and observations of their actions both in and out of the classroom, I believed that each participant would bring a unique perspective to the issue of middle school math acceleration.

The fact that they do not teach in the same school system (Harper and Cathy teach at one district, while Simon teaches at a second) was an intentional choice for participant selection. Though both school systems are in the same state and border each other, they have very different demographics; one is majority-white and the other has significantly larger Asian, Hispanic/Latino and Black populations (see Figure 2). Additionally, although they follow the same curriculum standards (CCSS), each district has different priorities when it comes to student course placement and acceleration. For example, District A (where Harper and Cathy teach) only began allowing eighth graders to take Geometry during the 2020-21 school year,[4] whereas District B (where Simon teaches) has offered eighth grade Geometry uninterrupted since well before CCSS was instituted.

[4] Although this ended up meaning the change was rolled out during the COVID-19 pandemic, the change had been in the works for several years, with the course sequence leading up to eighth grade Geometry instituted one grade at a time.

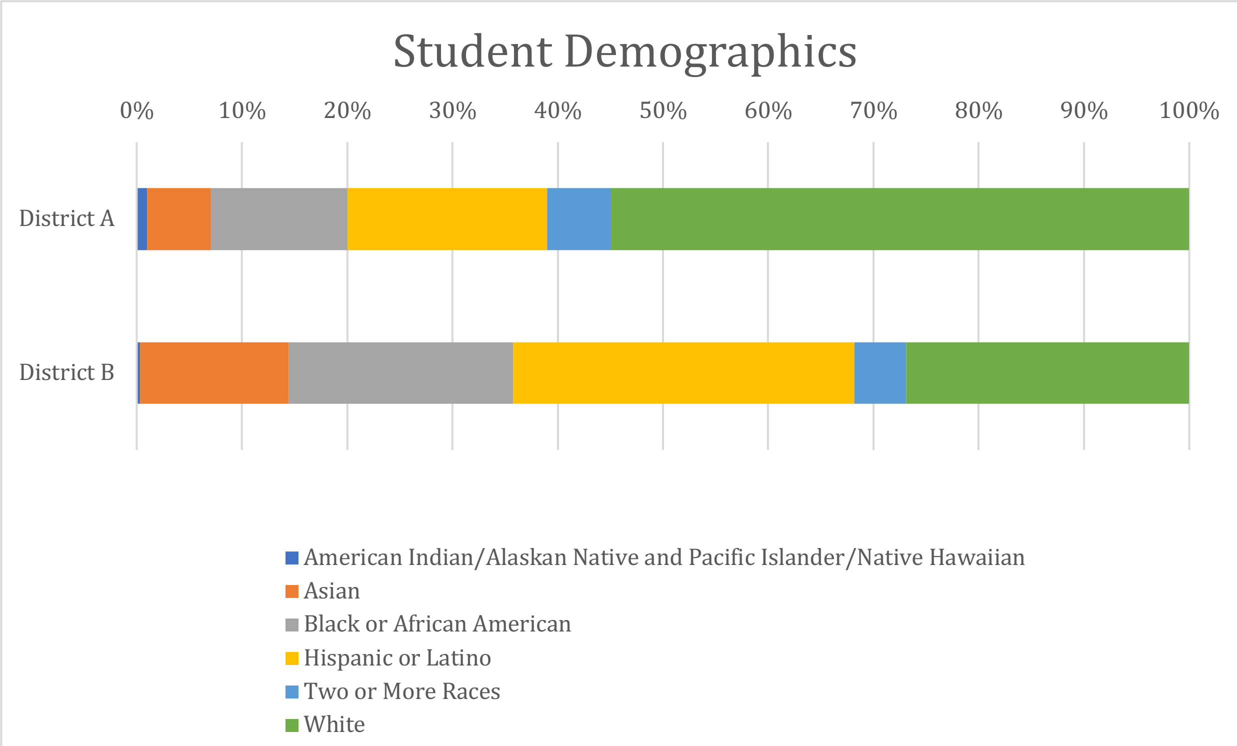

Figure 2. Student Demographics in Districts A & B.

The initial interview questions (listed in Appendix A) were developed with two main intentions in mind: seeking details for how placement occurs, and probing for opinions about the advantages and disadvantages of acceleration. While the focus of this thesis has been largely about examining the equity problems that accompany course acceleration, and each of the participants addressed that aspect in their responses, the interview questions themselves guided the interviewee to reflect on their own experiences. Each interview was conducted and recorded via a Zoom video conference, and follow-up questions were asked via email.

Finally, for the purposes of triangulation (Merriam & Tisdell, 2016), I also analyzed relevant school board meeting notes along with published course guides and parent communication resources. These artifacts were obtained via the internet and are public record. The purpose of seeking additional sources of information about this topic was twofold: first, triangulation enhances the validity of the interviews that were conducted for this thesis (Mathison, 1988). Second, examining the public-facing communication about course acceleration incorporates context of the issue in these two school systems.

An important disclaimer for this report is that the interviews were conducted during the 2020-2021 school year, which was a unique year in that school systems and educators were grappling with the difficulties of teaching during the COVID-19 pandemic. None of the interview questions specifically addressed these circumstances, but each educator did talk about how this specific school year affected placement and progression. In an effort to focus and simplify the data analysis, data that pertained specifically to the pandemic were not addressed. For example, when Cathy was discussing how elementary students are identified and placed into the pre-accelerated pathway, she acknowledged that they recommended very few students this year due to the quality of the education being impacted by online learning. While this is significant to the research that will be conducted about the effect of the pandemic on student learning, I am approaching it as an outlier when it comes to the discourse about math acceleration in general.

Coding

Each interview was transcribed and coded in order to allow for organized and intentional analysis (Merriam & Tisdell, 2016). Saldaña (2015) describes a wide variety of coding methods to utilize when analyzing and interpreting data, including *structural coding*, which he describes as "[applying] a content-based or conceptual phrase representing a topic of inquiry to a segment of data to both code and categorize the data corpus" (p. 97). As the goal of this research is to connect and compare the viewpoints of educators to the existing literature about course acceleration, structural coding was an appropriate way to understand and interpret the data.

After each interview was conducted and transcribed, several main themes emerged. A full list of the themes, along with the sub-codes that were used to organize the data analysis, can be found in Appendix B. Acceleration, tracking, placement, parent input, policy, standards, and bias were the themes that emerged from the literature review that best exemplified the topic of this thesis as it has been presented so far. Within these themes, sub-codes such as "against recommendation" or "playing the game", as examples under "parent input", were identified as topics that were present in multiple interviews.

Results

Each of the participants had experience in placing students into the course pathways, and discussed the measures that were considered when deciding whether a student should be placed into a higher track. In line with the factors that were discussed in the literature review, the main considerations for placement include data measurements along with subjective measures such as teacher, parent and student input. The course progressions for each district are given in Figures (3) and (4). This information was gathered from the districts' website pages about academics. Despite the fact that these two school districts border each other, there are clear differences in the pathways available to students.

In District A, which is where Cathy and Harper teach, all students started at a standard track which allowed all of the CCSS standards for 5th through 8th grade to be taught in their corresponding grade levels. At the middle school level, there are two accelerated math pathways: "Advanced I" which takes the content designated for CCSS 8 and allocates some standards to Math 7 Accelerated and some to the Algebra I course that is offered. However as of two years ago, an additional "Advanced II" course progression was added, one that shifts 6th grade content into 5th grade, and follows a progression from Math 7 to Math 8, ultimately culminating in a yearlong course which includes one semester of Algebra I and one semester of Geometry. Whereas placement for the Advanced I pathway occurred at the middle school level, this new pathway requires placement at the elementary school level. Both Cathy and Harper expressed uneasiness about the appropriateness of this curriculum change, with Harper lamenting that "[the district has] a lot of individuals who are above the decision-making of placement that do not have math backgrounds", and Cathy also noting that "unfortunately, people who don't necessarily know math are making these decisions."

In District B, students started on a trajectory that is more accelerated (relative to District A) with the option of moving students into a higher or lower track at later points in the progression. They list the "Standard" course progression as ending in 8th grade algebra, with options to enter a higher-level track starting in elementary school and a lower-level "Support" track in 7th grade. The district is able to accomplish this by offering a "Investigations in Math" (IM) course which combines the CCSS 7th and 8th grade standards into a yearlong course. The "Advanced" path allows for a year of Geometry in 8th grade, and requires student placement to occur at the elementary school level (as is newly the case with District A).

District A	Elementary 4	5	Middle 6	7	8
Standard	Math 4	Math 5	Math 6	Math 7	Math 8
Advanced I	Math 4	Math 5	Math 6 Honors	Math 7 Accelerated	Algebra I
Advanced II	Math 4	Math 5 & Math 6*	Math 7 Honors	Math 8 Honors	Semester Algebra I & Semester Geometry

* Math 5 & "priority standards" from Math 6

Figure 3: District A's Course Progression

District B	Elementary 4	5	Middle 6	7	8
Support	Math 4	Math 5	Math 6	Math 7	Math 8
Standard	Math 4	Math 5	Math 6	Investigations in Math*	Algebra I
Advanced	Math 4/5	Math 5/6	Investigations in Math*	Algebra I	Geometry

* Combines standards from Math 7 & Math 8

Figure 4: District B's Course Progression

The changes in the curriculum were not always met favorably by parents in these school districts. Cathy referenced the difficulty in explaining to parents why the experience of their older children might have been different than the curriculum that students are experiencing now:

> I think it's a lot about public perception and the fact that years ago before common core… families had older students who went through and did take Algebra I in seventh grade and Geometry in eighth grade, but it was a different algebra at that time. And the standards were not as rigorous.

In the switch to CCSS in 2010, District A re-structured their courses in a way that eliminated 8th grade Geometry altogether, while District B maintained the course progression it had before the switch and simply re-aligned the courses to the new standards.

On their websites, both counties offer resources for parents to help understand the math curriculum. District A has a designated web page for the middle school mathematics curriculum, which includes a vision for mathematics along with an explanation of essential curriculum standards. District B also has a central mathematics curriculum page, which includes a similar mission statement along with a brochure about the curriculum. The resources are readily available on the internet for families who know where to look, but it is worth noting that not all families know what information to look for, and guidance is usually given by guidance counselors in the schools (Lewis & Diamond, 2015; Noguera & Wing, 2006).

Research Question #1

Do educators believe that offering Geometry courses in middle school is a good idea?

Each participant had a different perspective on whether and when it is appropriate to provide accelerated course-taking opportunities to middle school students. However, the ultimate question of whether the participant thought that students should be accelerated into Geometry in eighth grade ended up being tied to the progression that their own district offered. Simon, whose school offers a Geometry as an option for students, felt that the students who took these courses were ready for the content. Cathy and Harper, whose district's accelerated middle school course pathway ended in algebra (until recently), felt that students would not be developmentally ready to take advanced courses at such an early level.

As was addressed in the literature review, the onset of Common Core led to changes in the mathematics content that was expected to be taught at each grade level and course. Simon discussed how this affected the content that was taught in his 8th grade Geometry course:

> [The] Geometry now contains a lot more of what I think used to be considered Algebra II type material, for example…in the old Geometry curriculum you wouldn't have even heard the word conic section. But with the new Geometry curriculum we spend a lot of time dealing with, you know, graphing of conic sections, the equations of conic sections, completing the square things like that… That was something that was never in the old curriculum that is now.

Cathy had a similar perspective on the shifting of standards, saying that "eighth grade now, which is pre-algebra is what algebra used to be… so many standards were shifted and were brought down to eighth grade." Harper agreed, citing that "I think Algebra I has increased its rigor than what we taught 10 years ago." It is curious, therefore, that the math progression in District B became largely unchanged following the implementation of CCSS, whereas District A stopped offering Geometry as a course option (until recently).

When discussing the advantages and disadvantages that the Common Core and current course progressions pose to their students' math education, Harper and Simon had differing opinions:

> **Harper:** Is it still preparing students for higher level mathematics? Not really. I'd like to say it's the floor, not the ceiling in terms of application and analysis. There's very little in terms of Algebra I that the majority of the population, if they took the time to really focus on and practice, the majority of adolescents and adults could do Algebra I.
>
> **Simon:** Does [the Common Core pathway] really prepare the kid to take an accelerated course that early? I think it does. However, I think that it also, I find kids that are very successful within those courses, that if you ask them a different type of question or phrase a different way, they would have a lot of trouble.

The participants' views on the curriculum they are teaching is an important factor when it comes to understanding their views on student acceleration in mathematics. Perceptions of difficulty level, content skipping, and public perception all contribute to the overall viewpoint.

Finally, one more topic that was addressed in each interview was the consequences for students who take algebra or Geometry in eighth grade. As was previously discussed, in a traditional yearlong course setting, students are expected to take four mathematics courses in a sequential manner. If a student enters their freshman year having not taken algebra, the farthest they will be able to get in the progression is precalculus during their senior year. Taking calculus makes students more competitive on college applications, so students who are able to take algebra earlier are at an advantage over their peers. This yearlong course structure is used by Simon's district (B), but in District A, the high schools use a semester system wherein students sign up for eight courses each year (four in the fall semester, four in the spring). Due to this structure, students who do not take algebra in eighth grade are still able to take calculus if they "double up" in at least one of their school years. For example, a student could take both algebra and Geometry during their freshman year, and could get on the same track they would have been on had they taken algebra during eighth grade in District B. Students are also still given the opportunity to take Algebra I as a yearlong course as freshmen if they choose.

For the question of whether it is appropriate to accelerate students in math to the point where they were taking Geometry in eighth grade, Cathy and Harper tended to agree that it was not appropriate to accelerate students to this point, while Simon tended to hold the viewpoint that Geometry in eighth grade was appropriate for certain students. It is worth noting that the difference in opinion for this particular question was divided along county lines. Cathy and Harper teach in District A, where until recently Algebra I has been the culminating course for the accelerated pathway, and Simon teaches in District B, where Geometry has been an option for eighth graders for many years. This indicates that potentially, teachers' view points and the curriculum progression for the county they teach in could be correlated in some way.

Research Question #2a

What do educators identify as the most important factors that should be used for placing students into advanced math courses in middle school?

In both districts, participants indicated that quantitative data, such as test scores, are the main consideration when placing students. Cathy described a rubric that was used in her district to place students into the accelerated pathway that started in 7th grade. There were 7 data markers, each of which had a total of 5 points that students could earn.

Assessment data included the county-level benchmark assessments, state-level standardized tests, a norm-reference test that was given mid-year and classroom-level pre-assessments and unit tests. Additionally, report card grades were examined, along with a teacher-indicated "academic processing" score. Simon also indicated a preference towards quantitative data measurements. "Perfect world," he said, "I like the idea of having a, you know, a test. I think it should be more standardized."

In general, the type of student who was described as being appropriately placed (meaning they were successful in the course both in terms of achievement and understanding) was described as hard working and curious. In Cathy's view, "if they're not willing to work hard, then they really shouldn't be in an accelerated program anyway." This indicates that Cathy feels that since the coursework is difficult, the student needs to be prepared to work hard. Simon, on the other hand, mentioned that, "it's easy to mask math ability by just being a good strong student." Harper expressed that there are two types of successful students in accelerated courses, those who are curious and those who are externally motivated:

> I think it's split. So we have some students who they really, they have that curious nature. They're curious about mathematics. They're curious as to why it happens…. Then with some students, they are acutely aware of what their parents' expectation is and where their parents expect them to be. And that, I find, drives [a] totally different student... They tend to be more of the student that is what's the algorithm to solve it.

Regardless of the "type" of student, Harper was clear that work ethic is an important feature in a successful math student. She likened math learning to being on a sports team, one where continual practice is necessary for the right "muscle development". This paper does not address the body of literature within math education research which examines "grit", but this viewpoint is common among more traditional educators.

In addition to students being willing to work hard, all three participants agreed that math ability (or preparedness) was also important for success. Ability was discussed in terms of both skill fluency and conceptual understanding. A good example came from Simon's description of some students in his 7th grade algebra class who he felt were not as prepared for the course as was preferable:

> But I do find that there's so many students pushed into those courses… I mean, granted, I have a seventh grade algebra class and, you know, those are your top kids and we're doing factoring. And you still have students that, a couple of them… they have the aptitude to do what's in front of them, but they even struggled with the, what the factors are of a number.

Knowing the factors of numbers is a topic that arises in elementary level math, and is considered essential for understanding the more advanced factoring (including expressions that contain variables) that occurs in Algebra I. Cathy also discussed the importance of having a same foundational knowledge in proportional reasoning in fifth and sixth grade. The main difference in the views between these two participants is that Cathy believed that students should not be placed in accelerated courses if they do not have the proper mathematical background, whereas Simon generally believed that it was fine for students to take these courses even if they weren't fully prepared.

Harper's view on math ability was two-fold. When addressing Geometry, specifically, she said "very, very few students, I feel, can make that jump to Geometry. Not because they can't do the math, but because I don't know that they understand the justification behind the proof." For Harper, there is a distinction between a student being able "do the math" and actually understanding the concepts. Similarly to Cathy, lacking the conceptual understanding is enough to make her feel that a student should not be taking an accelerated course. She feels that in order to truly succeed in an advanced mathematics course, students need to be able to generalize and conceptualize math at an advanced level, and, according to Harper, “a lot of students can’t think that way, that young.”

Simon, who works in a district that has yearlong courses in high school, also addressed how the course progression affected tracking decisions at the middle school level. He explains:

> I would say the rationale for recommending a [rising eighth] grader retake algebra is more to slow them down as it is that we don't think they're really fully ready for Geometry. It's more that they struggled in [Algebra I in seventh grade] and they just, they, we know that they're probably going to be able to handle Geometry, but they're probably not going to be able to handle honors Algebra II as a freshman.

This was the case for Cathy’s daughter, who was not placed into the accelerated course pathway and didn’t take algebra until her freshman year. As Cathy describes it:

> And then it was time for high school and I had her take full year algebra and I will, I can say that she was never more confident. After having a full year to really delve into that, you know, that content she did to double up in her sophomore year. And she took Geometry and Algebra II in the same year because of our block schedule.

Harper describes the yearlong course structure as “the driving force in the secondary push for acceleration,” and similar to Cathy she appreciates the semester (or block) schedule when it comes to math course progression. She does note, however, that “there are some kids who cannot afford to have a semester off of a course. They can't go then six months without practicing or doing that skill.”

When it came to placement, participants agreed that hard work and math knowledge were important considerations for student placement. The mentality of “you have to know the math" came up in each interview, which makes the difference in how students are actually placed puzzling. If both districts design their courses according to CCSS, then presumably the mathematical knowhow would be the same for students coming out of elementary school. However, Simon seemed more on board with students skipping courses in order to jump to a higher track. Again, the main difference between these districts when it comes to middle school courses is the level to which they accelerate.

Research Question #2b

What do educators identify as the factors that actually motivate student placement?

All of the participants brought up one well-understood aspect of the Common Core curriculum: that it was designed to limit the amount of "content-skipping" that occurred. This practice is supported by the conclusions of Cogan, Schmidt & Wiley's (2001) work, which illuminated the vast differences in OTL in math courses across the country. The participants reflected on the effect that the approach of limiting content skipping has on accelerating students.

Harper justifies the hesitation to accelerate students: "It's not because we are trying to not let students in, it's because the curriculum is strictly written… in the form that there is no skipping of standards." Simon, on the other hand, mentions that "our [curriculum] structure…was to allow students to make it to a high-level class without skipping any content," but added that, "if you decide later after third grade to move a kid into the class, that often means they're going to have to skip a lot of content." This indicates that, despite acknowledging that CCSS does not support skipping content, District B employs this practice in order to continue the student acceleration that occurred before the standards were implemented.

Simon provided illumination on this decision when he described policies that come from the district when it comes to placing historically marginalized students. Student placement in District B largely occurs at the elementary level, and Simon's role as math resource teacher puts him in the position of deciding whether to have students "jump tracks" and skip sixth grade math, for example. He described efforts that were being made by the county to combat the lack of diversity in the higher-level math courses. According to him, the district will also do data analysis and "give him a list" of students to consider for higher placement. In this, it appears that the efforts to combat the inequities in enrollment in higher-level courses occur at the middle school level, and the fear of "content skipping" is overlooked in favor of more equitable student distributions.

Both Simon and Cathy specifically addressed bias in placement decisions. Cathy reflected that in her experience as a math specialist, when using the placement rubric, she had to take both prior grades and the teacher-reported academic processing skills "with a grain of salt." Simon agreed with the necessity of being cautious on taking teacher placement at face value, indicating that he was "certainly sure that there is implicit bias." All three participants were aware of the potential for racial bias influencing the placement process, but Simon and Harper were the only ones who articulated a belief that it was influenced by sociological forces—as was addressed in the literature time and time again.

Simon discussed the district-motivated pressure to place historically marginalized students into these classes, indicating that not only was his district aware of the disparities in the student populations, but there was practice in place to correct the inequity. Harper expressed that a number of districts in the state required that the accelerated course student population at a school should mirror the school's overall student makeup. For example, “if you offer two accelerated courses, those courses [should] have a combined nature that is similar to the student population of that building.”

Although I interpreted her phrasing as more roundabout than Simon’s, it appears that both districts are aware of the unrepresentative distribution of students in the higher-level math courses, and have indicated that they want this to change. However, despite policies that attempt to enact this, the class makeup is still unequal.

> You know, cause frankly right now, I mean looking at our top track and there might be. One or two minority students in a group of 30 students. And that's, that's much different than our overall makeup of our student body.

Another factor which participants expressed played a role in student placement was parent and student input. Cathy and Harper were able to discuss their perspective as parents in District A. Cathy’s daughter was not in the accelerated pathway, but she ended up taking honors designated Math 8 in eighth grade. Harper has two sons who have gone through the placement process within the last few years, one of whom was recommended and the other who was not. Both spoke about the interactions they had with other parents in their social networks, and reflected on the need to “play the game,” as Cathy put it. In both districts, it is evident that students and their families are given the opportunity to have a say in their course placement. In fact, Harper noted that in every school district she’s worked, “the parent has the final say.”

Simon also discussed the phenomenon of families accelerating their students against the school’s recommendation, but in his experience, it came from the student more often than the parents. “surprisingly it actually seems like it comes more from the kid than the parent… most parents when I've talked to, they'll say things like, ‘this is coming from them.’” Cathy has had similar experiences with students, citing a situation last year where a seventh grader was struggling in a Math 8 classroom, but when she tried to discuss the issue with the parents they said that it was the student who wanted to be in the class. Both Harper and Simon had justifications for why this might be, saying that “sometimes when it says it's from the kids… it is from the parents.” Peer influence was also addressed by the participants:

> **Simon:** And I think a lot of motivation comes from, I want to be with my friends and known as the highflyer as opposed to, you know, very often when kids say they're bored, they're not always bored.
>
> **Harper:** You know, does the student truly want to accelerate and do they understand what it means? It's not just being in a class with their friends.

Though it was not explicitly stated by any of the participants, the sub-text of the interviews was that the families who were able to “play the game” and go against the recommendations made by the school were largely high-SES parents. This supports many of the findings found in the literature review, such as Lewis and Diamond (2015).

For out-of-district students, Harper’s approach to placing students in the accelerated math track was more holistic than merely using the district-assigned placement rubric, and incorporated qualitative input from the students and parents. She explained how these conversations would be more focused on attitudes towards math and growth mindset:

> So we look at all of the historic data we have available for students. And then we consider all of the subjective data that we can get. Teacher input, parent input. If it is a new student coming in from out of district, I actually give them a student survey that is not math problems… I also do an actual student survey, you know, that is subjective. How do you feel about math? How do you feel you're doing a math? Because we know that growth mindset is a huge component to understanding at the adolescents age with middle school mathematics.

Cathy seemed to be aware of the potential consequences of including a subjective indicator, adding that "I think we need both you know, cause you never know whether teachers have bias. We have to be really careful." She placed more weight on the placement rubric than Harper did, and expressed contentment with the fact that it was so heavily weighted towards quantitative data measures; she also expressed frustration with the fact that not all school administrators used the rubric the same way:

> At one point I had a principal who, she wanted to have two classes of Algebra students. And so she would adjust the criteria and say, well, instead of having 21 as the criteria, you know, qualifying criteria, she would take kids as low as 16. And so they clearly didn't have the understanding of the proportional reasoning and the experience with fractions.

All three participants from both school districts recognized factors that were beyond their control when it came to student placement. Although Simon and Cathy preferred access to quantitative data measures, all three educators were aware of the fact that these measures were not always fair to historically marginalized students. They were aware of the disparities between student populations in the accelerated classrooms as compared to the overall student population, and seemed frustrated that the efforts to combat these disparities were failing. They also recognized that despite their recommendations, parents still have the option to register their students for whichever course they choose.

Discussion and Conclusions

Much of what the participants said about placement, including how their decision-making process was influenced by factors that were beyond their control, corroborated what was discussed in the literature review. That being said, there were some data that were surprising in the face of what I expected the participants to say, for example, the fact that the parents claim that the motivation to accelerate comes from the students. While the participants expressed that this could be the parent pushing the child to have this mentality towards their education, this in and of itself is a finding which is not expressed in existing studies which address parental involvement.

Another significant contribution from this analysis came from the discussion about how the course structure at the high school level affects the middle school math acceleration. The fact that District A offers students the opportunity to take multiple math courses per year in high school means that they do not have to worry as much about taking Algebra I in middle school. At first, this might seem like an excellent opportunity to combat the factors that contribute to racialized math tracking since students are given an opportunity to "catch up" later. However, it is worth considering that this is a back-end solution that puts the burden on the student rather than addressing the root causes of *why* the track placement is unequal to begin with.

The frustration that the participants in this study expressed when it came to the disconnect between how they felt students should be placed and the outside forces that actually lead to student placement is significant. These educators wanted to be able to teach students at a level that was mathematically appropriate for them as learners, but systemic racism and privilege make it so that the classes tend to be weighted towards white students who are there because their parents encourage them to work hard and want to be at a higher level.

Even with the school districts attempting to combat this inequity by encouraging schools to make the racial makeup of their courses reflective of the overall student body, what is actually occurring at the classroom level appears largely unchanged. According to the participants, this is likely due to the fact that the quantitative measurements are still a main consideration (which, as was established in the literature review, is problematic because of how historically marginalized students tend to perform poorly on these measures), and parents still have the “final say” when it comes to student placement.

While the participants may crave an idealized world where middle school students can be placed into the math course that best suits their needs, the presence of even further advanced math courses such as Geometry may just provide additional pathways and opportunities for privileged students. A conclusion that can be drawn from the literature—and which is re-affirmed here—is that even if pathways that lead to advanced math courses start in in later elementary or even middle school (i.e., the onset of tracking is delayed), inequity in which students access these courses persists. Therefore, I believe that the lens used by both researchers and administrators needs to be focused even more on the elementary level, and should examine the forces which motivate low achievement scores and academic success at the very beginning of a student’s progression.

Limitations

This study was a sampling of three teachers from a single region in the United States. The views expressed in this analysis cannot be generalized as the views of educators in other regions and countries. Furthermore, these school districts are well-funded and consistently produce achievement results that are higher than the national average. Even within these districts, a sample of three teachers does not capture the rich diversity of educator perspectives across all schools.

Most of the experiences that were addressed in this study were at the middle school level. Each participant referred to important aspects of the acceleration process that took place at either the elementary or high school level. A variety of perspectives from different age and grade levels would have given a better representation of the process as a whole, especially a more in-depth look at placement at the elementary level. The participants cited achievement data as an important aspect of middle school placement, but were not able to provide much context for the data, which the literature tells us is important for the conversation around equity (Mickelson, 2015).

Future Research

The purpose of qualitative data, in my view, is to enhance quantitative data. It can illuminate phenomena and provide direction for quantitative data gathering and analysis, or it can provide a richer context for already existing quantitative studies. In this case, in addition to situating the participants' perspectives in the existing research on math tracking and accelerated course-taking, it provided a research question that is in need of further study: are teacher's viewpoints on whether students should have access to eighth grade Geometry influenced by whether this course already exists in their home school system? In order to truly answer this, interview data from three teachers does not suffice beyond acting as a jumping-off point for larger-scale data analysis.

One other conclusion which emerged from this analysis that merits further exploration is the relationship between middle school math course availability and high school course structure. The fact that most of the students in District A do not take Algebra I until ninth grade is counteracted by the block schedule that allows a possibility for students to feasibly “double up” in math during one or more of their high school years. Because District B did not offer this option, acceleration was pushed to the middle school level, since it would be very difficult for a student to move up a track after eighth grade. Large-scale quantitative analysis would be necessary to conclude whether this connection is valid.

Additionally, as was discussed previously, I did not address data that specifically pertained to the COVID-19 pandemic. However, each participant did express concern about how this school year will impact students’ learning progressions due to the gaps in learning that have occurred due to the less-than-ideal delivery of content (online learning). This school year has been difficult for students and educators, and there will undoubtedly be long-term consequences. A direction for future research is to revisit the participants from this study (and others) in future school years in order to gather longitudinal data about how middle school course acceleration is affected by the pandemic.

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Appendix A: Interview Questions

Topic of Inquiry	Questions
Placement	• Have you ever had to make recommendations for student math placements? If so, describe that process. • What makes you decide to place a student in one math track over another? • Can you describe the progression that leads students to taking Geometry in eighth grade? • Has a parent ever gone against your recommendation for their student?
Acceleration	• How has the content taught in algebra and geometry changed since the shift to Common Core standards? • How would you describe your “grade level” classes as compared to your “honors” or “accelerated” classes? • Both in terms of content and in terms of the student body make-up? • Do you think students who are placed into geometry are developmentally ready for this level of advancement?

Appendix B: Code Structure

Theme	Sub-Codes

Acceleration	• Work ethic
	• Developmentally ready
	• Course Progression
	    • Middle school
	    • High school

Tracking	• Elementary • Grouping • Jumping tracks
Placement	• Data markers • Standardized tests • Subjective indicators
Parent Input	• Playing the game • Against recommendation

Policy	• Administrator decisions
	• Diversity efforts
	    • County-level
	    • School-level

Standards	• Shifting content • Difficulty level
Bias	• Racial • Ability grouping